AD-A153 652 RAPID DRINKING DEVICES CONSTRUCTED FROM IV BAGS AND PLASTIC SQUEEZE BOTTLES(U) ARMY RESEARCH INST OF ENVIRONMENTAL MEDICINE NATICK MA I V SILS ET AL. 1/1

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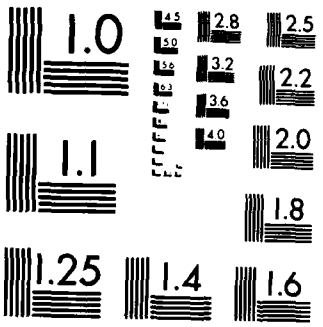

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Adequate fluid intake is essential for any athlete involved in long distance running.

The primary problem with using a plastic water bottle during a race is that it must be held upright and squeezed tightly while the runner holds his breath and waits for a sufficient amount of water to enter his mouth before swallowing. With this procedure very little water is actually (cont)

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consumed.

We have designed a drinking device which allows the athlete to consume large quantities of fluid in a short period of time with minimal loss of contents through accidental spillage. The device can be constructed either from an intravenous (IV) bag obtained through a physician or a medical supply house, or from a standard plastic water bottle. By drinking from the inverted device, approximatley one cup of water can be consumed in about seven seconds.

Rapid Drinking Devices Constructed From I.V. Bags and Plastic Squeeze Bottles

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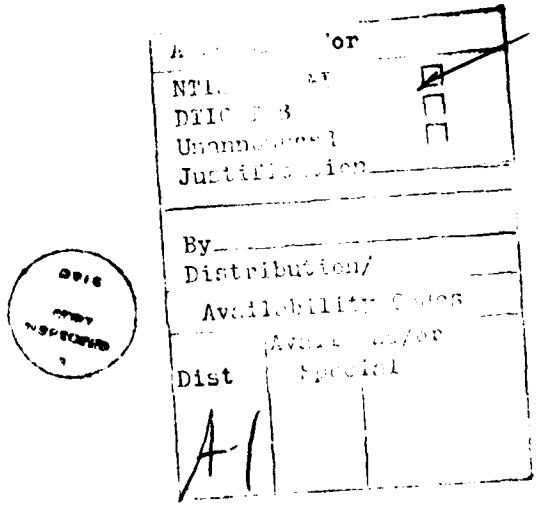

Adequate fluid intake is essential for any athlete involved in long distance running. This is especially true when the athlete is acclimatizing to, training in, or competing in, hot environments where heavy sweating may result in severe dehydration that can lead to heat injury.

Background:

The range of dehydration most important to the coach and athlete is quite narrow, from 2% to 6% loss of body water. Thirst is frequently not a good indicator of fluid loss since the athlete can already be 2% dehydrated before he or she feels thirsty. Furthermore, under conditions of intense work and heat, it is possible for the athlete to lose 6% body weight through sweating within three hours if fluid loss is not replaced by drinking. Prevention of dehydration should not be underestimated since even mild dehydration of 3% to 5% of body weight is known to reduce endurance, strength and the willingness to work and also decreases the body's ability to dissipate heat, predisposing the individual to severe heat injury (1).

The problem of adequate fluid intake for long distance runners is greater than for others who participate in events of short duration. During a competitive event, experienced distance runners realize that drinking from plastic water bottles or from paper cups placed at designated water stations usually results in very little water being ingested with most being either spilled or discarded. The primary problem with using a plastic water bottle during a race is that it must be held upright and squeezed tightly as the runner holds his breath and waits for a sufficient amount of water to enter his mouth before swallowing. This process must be repeated many times in an attempt to quench thirst. Generally speaking, the athlete's thirst is rarely ever satisfied before he must again concentrate upon the course and

his opponents. Likewise, drinking from a cup has drawbacks because the runner has to contend with water spillage and an obstructed view of the course while bringing the cup to his/her lips. This usually results in more water being lost than consumed.

We have designed a drinking device which can be used not only by the jogger and world class marathon runner but also by any other track and field athlete. This device allows the athlete to consume large quantities of fluid in a short period of time with minimal loss of contents through accidental spillage. The device can be constructed either from an intravenous (I.V.) bag obtained through a physician or a medical supply house, or from a standard plastic water bottle.

Directions:

Starting with a plastic hospital I.V. bag (either 250 ml or 500 ml), cut directly below the seal on the drainage nozzle (B, Fig.1) leaving a stub with a wide opening to the bag. The injection/air nozzle (A, Fig.1) is left intact. Drain the contents and thoroughly rinse out the bag. Setting the bag aside, cut a 9-12 inch piece of Tygon brand tubing (C, Fig.1) or equivalent, 5/16" interior diameter, to correspond to the exterior diameter of the I.V. bag drainage nozzle. The length of the tubing can always be trimmed to suit individual preference. Wipe the tubing and the bag nozzle clean with either acetone or alcohol. Slide the tubing over the I.V. bag drainage nozzle and cement the two pieces together by applying Silastic brand adhesive (Dow Corning Medical Silicone Adhesive). Allow 24 hours for the silastic adhesive to dry.

If the athlete prefers using a standard plastic water bottle to drink from, an alternative would be to remove the tubing which comes with the

bottle, enlarge the hole in the cap, insert a section of larger bore tubing through this opening (again, Tygon tubing can be used) and cement it into place. Here again, the tubing should not extend more than one to two inches into the neck of the bottle.

Once the drinking device is filled, water loss can be prevented by securing a spring clamp or a rubber band around a folded section of the tubing. Drinking is accomplished by removing the clamp or by simply flipping off the rubber band, and then inserting the tube in one's mouth and inverting the device. By squeezing either the bottle or the bag, water will escape rapidly enough so that 250 ml (approximately 8.5 ounces) can be drained in approximately 7 seconds. With such a drinking device, the runner can drink more water at a much faster rate than with other methods, which may be beneficial in reducing dehydration.

Costill and Saltin (1974) estimated that maximal gastric emptying during exercise rates at 70% of a persons maximal oxygen uptake, is 250 ml/15 minutes, or 1 liter/hour. Therefore, drinking more than 250 ml per 15 minutes would not be sensible since volumes greater than this would swell the stomach. Feedback from one world class marathon runner using these drinking devices indicated that he experienced severe stomach cramps on one occasion. This was perhaps due to a pocket of air being forced into the stomach by drinking too rapidly. Subsequently, however, this same runner found both types of these devices (the modified I.V. bag and the modified plastic squeeze bottle) to work favorably during a study at our Institute. In addition, these drinking devices were used as an integral part of this athlete's training, and accompanied him to the 1984 Olympic marathon in Los Angeles. This athlete's experience reinforces our belief that each runner using such a device should initially practice in order to adjust both the volume and the temperature of the water to meet his or her individual needs.

The opinions or assertions contained herein are the private views of the authors and are not to be construed as an official position, policy, or decision of the Department of the Army or the Department of Defense.

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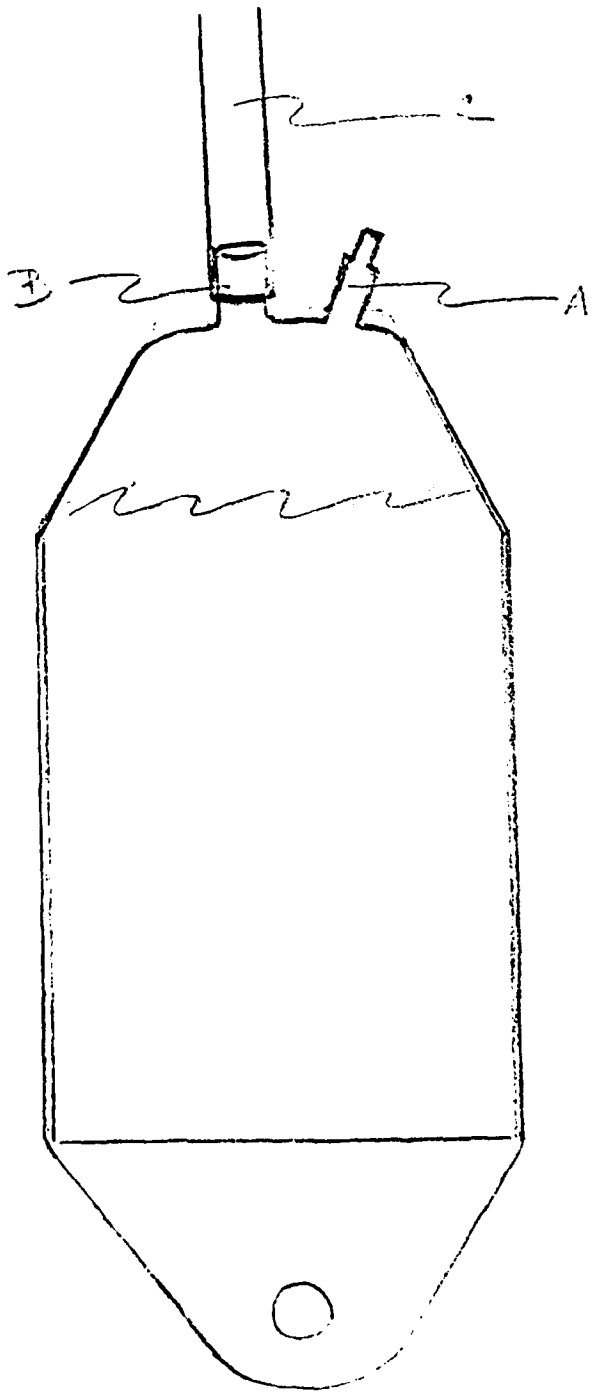
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